REMARKS

In view of the above amendments and following remarks, reconsideration of the rejections contained in the Office Action of June 26, 2003 is respectfully requested.

A number of minor editorial changes have been made to the specification and abstract to generally place the present application into better form. These have been presented in the form of a substitute specification and abstract. No new matter has been entered.

In the Office Action the Examiner rejected claim 5 as being indefinite. However, all of original claims 1-13 have now been canceled. As such, this rejection has been rendered moot.

The Examiner further rejected claims 1, 4, 6 and 8 as being unpatentable over Kimura et al., U.S. 6,077,385 in view of Suzuki, U.S. 6,332,832. In section 5 on page 4, further, claims 2, 3, 7, 9 and 13 were rejected as being unpatentable over Kimura in view of Suzuki and in further view of Ishikawa et al., U.S. 6,431,949. Further, in section 6 on page 5, claim 10 was rejected as being unpatentable over Kimura in view of Suzuki and in further view of Nyui et al., U.S. 6,503,361. In section 7, claim 11 was rejected as being unpatentable over Kimura, Suzuki and Nyui and in further view of Lim, U.S. 3,855,024. Claim 12 was rejected as being unpatentable over Kimura in view of Suzuki and in further view of Suzuki et al., 6,562,695. However, it is respectfully submitted that the present invention clearly distinguishes over all of the references cited by the Examiner.

Thus, as noted above, all of original claims 1-13 have been canceled. These claims have been replaced with new claims 14-37, including independent claims 14, 16, 23, 30 and 37. Each of these claims has been carefully drafted so as to fully comply with all of the requirements of 35 U.S.C. §112, second paragraph. Further, each of these claims clearly distinguishes over each of the references cited by the Examiner.

Each of the claims of the present application is directed to, in one sense or another, multi-process polishing. For example, claim 14 recites a control mechanism operable to control plural polishing processes on the polishing surface of the polishing table. Claim 16, for example, recites that after a first metal layer has been removed, the polishing fluid is changed. The same is true for each of claims 23, 30 and 37. These claims also recite additional features.

What is further common to each of the independent claims is their recitation of a film thickness detector including an eddy current monitor for detecting a film thickness of the semiconductor substrate.

It is noted that neither the Kimura patent nor the Suzuki patent discloses or suggests a film thickness detector that includes an eddy current monitor. Indeed, as the Examiner acknowledges in section 5 on page 4 of the Office Action, both of these patents fail to teach a thickness detection means. However, the Examiner cites Ishikawa as teaching a thickness measurement gauge as discussed in column 4, line 3 of Ishikawa.

More specifically, the Examiner cites Ishikawa as teaching the motivation of providing a thickness determining means to determine which type of polishing is appropriate for the substrate, either rough or fine polishing. However, what this part of Ishikawa states is:

> the wafer 26 at that point is roughly ground in accordance with a result of the thickness measurement. The thickness of the wafer 26 that has been roughly ground at the rough grinding stage 18 is measured by a thickness measurement gauge (not shown) after the grinding wheel 56 retreats from the wafer 26. Column 3, lines 66, to column 4, line 4.

It initially appears that Ishikawa is suggesting something that measures the thickness of the wafer as a whole, and not a film thickness measurement gauge. That is, it does not appear that Ishikawa is suggesting the measurement of the film on the substrate, but the thickness of the substrate as a whole. Ishikawa further discusses a thickness measurement part 96 in column 8, lines 32-40. However, this also appears to be discussing measurement of the thickness of the cleaned and dried wafer 26 overall for the purpose of executing dressing in accordance with the result of the measurement.

There does not appear to be any disclosure or suggestion of a film thickness detector including an eddy current monitor for detecting a film thickness.

The present invention, as reflected by the above claims, detects a thickness of a film layer on a substrate with an eddy current monitor, with the layer being polished in a multi-step process. For example, in claim 14 the control mechanism is operable to control a change from one polishing

process to another on the basis of a film thickness detection signal from a film thickness detector. In claim 16, the first polishing fluid can be changed to a second polishing fluid when the eddy current monitor detects a state in which a first metal layer has been removed. Also note the language of claims 23 and 37. Because of each of these claims employs an eddy current monitor, they clearly distinguish over the references cited by the Examiner.

Further, claim 30 recites a method of detecting a film thickness of a first metal layer with an image processing device during polishing of the first metal layer. Further, the method changes a first polishing fluid to a second polishing fluid when the image processing device detects a state in which the first metal layer has been removed. Then the second metal layer is polished and a film thickness of the second metal layer is detected with the image processing device. None of the references cited by the Examiner disclose or suggest a film thickness detecting device used to detect a film thickness of a first metal layer with an image processing device during polishing of the first metal layer, for example. Nor do they suggest a change of polishing fluids when such an image processing device detects that the first metal layer has been removed.

From the above, it can be generally seen that the present invention, as reflected by each of the independent claims now pending in the present application, are directed to methods and apparatus which address problems and ways of polishing that are not addressed by the prior art. The above specific differences between the claims and the cited prior art are reflective of these different overall purposes between the prior art and the present invention, furthermore. Accordingly, it is respectfully submitted that all of the claims pending in the present application distinguish over the references cited by the Examiner against the original claims.

The additional references cited by the Examiner include the Nyui patent, which does disclose a film thickness measurement means. However, there is no disclosure or suggestion of an eddy current monitor as required by the above independent claims, nor is there any disclosure or suggestion of the method of claim 30 including the use of the image processing device in detecting the thickness of first and second metal layers and using such information to change polishing fluid. It is noted that Nyui et al. appears to use light for measurement. As noted above, if a metal layer is thick, the metal layer may totally reflect the light so that no thickness of the metal layer can be obtained.

The further cited references appear to be no more relevant than those discussed above, and as such it is not deemed necessary at this point to discuss them in further detail.

The Examiner's attention is drawn to the enclosed Information Disclosure Statement forwarding a number of additional prior art references.

The Examiner's attention is further directed to the enclosed formal claim for priority forwarding the priority documents for this application.

Also please note the enclosed substitute drawing Fig. 4 making drawing corrections to this application. The corrections are to the reference numerals so as to be consistent with the specification.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance, and the Examiner is requested to pass the case to issue. If the Examiner should have any comments or suggestions to help speed the prosecution of this application, the Examiner is requested to contact Applicants' undersigned representative.

Respectfully submitted,

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